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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/982,721	SLOCOMBE ET AL.	
	Examiner	Art Unit	
	ASHOK PATEL	2154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _29 May 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-41_ is/are pending in the application.

4a) Of the above claim(s) _8,10-13 and 18-29_ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-7,9,14-17 and 30-41_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _06/03/2008_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-23 are subject to examination. Claims 8, 10-13 and 18-29 are canceled.

Response to Arguments

2. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 4, 14, 16, 17, 30, 31, 34, 35, 38, 39 and 41 are rejected under 35 U.S.C. 103(a) as being Unpatentable over Kavak (US 6, 687, 731) in view of Yates et al. (hereinafter Yates) (US 6, 167, 438)

Referring to claim 1,

Kavak teaches a method of content delivery in a network (Abstract), comprising:

associating each of a plurality of devices in a Domain Name System (DNS) with one of a plurality of server systems located in the network and maintaining on each of the server systems content stored on an origin server (Fig. 1, elements 1-8, col. 3, line 10-29, “In FIG. 1 is shown a diagram over a preferred arrangement according to the invention. A client computer 1 has a virtual circuit connection established to its domain name servers (DNS) 2, of which one is shown in the figure, via the network 3. There may be a secondary connection to a reserve domain name server (not shown) which

can be accessed at error or at break/interruption. In the network there are a number of routers 4, which establish connections with servers 5A to 5E as service suppliers. All the servers 5A, 5B, 5C, 5D, 5E are copies of each other and constitute the same anycast-group or "common address group". Anycast-groups only transmit a virtual IP-address to their neighbours. A logical address can correspond to a number of physical addresses.

The domain name server has knowledge of all anycast-groups. <u>For scaling and performance reasons anycast-groups can be distributed over many domain name servers.</u> The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.”);

assigning to the DNS devices a common address (col. 3, line 65-col. 4, line 10, “To select one server out of the different suitable, exactly alike servers, anycast-technology is used. **<u>An anycast-address (common address) is used to represent a group of nodes, one of which shall be selected.</u>** When an anycast-address is received, the domain name server delivers the IP-address to all destinations which are represented by the anycast-address. Since many servers can have the same anycast-address, the router conventionally selects one of them by collecting information about the number of jumps to the different servers and selects the nearest one. Use of links is another at present available criterion. Other possible criteria are costs, processor load, storage, routing policy etc.”, col. 3, line 10-29, “The domain name server has knowledge of all anycast-groups. <u>For scaling and performance reasons anycast-groups can be</u>

distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.");

advertising, by each of the DNS devices, the common address within the network to indicate that the content is available for retrieval from each associated server system by end user systems communicatively connected to the network (col. 4, line 31-35, "To make load sharing distribution to least loaded servers, each server needs to inform the surroundings about its accessible resources. To this purpose a Resource Advertisement (RA) is transmitted. At calculation of service quality routes (QoS routes), RA is used.", col. 4, line 54-57, "The number of links is the link number which is included in the resource advertisement. For each link, the link type, link identity, and link data, are the same as for the routing resource advertisement.", col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.");

monitoring one or more load characteristics of one or more of the server systems in the network (col. 2, line 1-6, "Preferably the domain name server is arranged to select the least loaded replicated server or the nearest replicated server. Each replicated server can transmit a resource message which contains information about available resources at the server in question, and about the link parameters of the server.");

determining if one or more of the load characteristics exceeds a predefined overload metric (col. 3, line 39-50, "The type of application assists the domain name

server in selecting the most relevant server for each request. In some cases the least loaded server is selected, whereas in other cases the cheapest link and belonging server is selected.

The domain name server receives continuously routing information from all anycast-servers which it is serving. The routing information is transmitted via the connections marked 7 in the FIG. 1. The routing information includes details about the available capacity for each link, the number of jumps to each server, the bandwidth of each link, the processor capacity, measured delay etc. The domain name server returns the IP-address to the server which is best adapted to the application demands which are derived from the DNS-request. When the IP-address has been resolved, it is returned to the client computer so that a direct connection is established between the client computer and the server."); and

discontinuing advertising of the common address by each DNS device associated with a server system determined to have a load characteristic that exceeds the predefined overload metric col. 4, line 31-35, "To make load sharing distribution to least loaded servers, each server needs to inform the surroundings about its accessible resources. To this purpose a Resource Advertisement (RA) is transmitted. At calculation of service quality routes (QoS routes), RA is used.", col. 4, line 54-57, "The number of links is the link number which is included in the resource advertisement. For each link, the link type, link identity, and link data, are the same as for the routing resource advertisement."

col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.")

Kavak's following teachings, as gleaned from the perspective of an ordinary skills in the art, are also of paramount importance:

1) col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.")

2) Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc."

3) Consequently the present invention provides an arrangement for load sharing in a computer network, comprising a larger number of users or clients with computers,

at least one service supplier which provides services via a number of replicated servers, a computer network with routers which can connect the client computers with the servers in order to connect a client computer which requests a service with suitable server.

According to the invention a number of replicated servers belong to a common address group (anycast-group) and each anycast-group is connected to a domain name server which has the ability to select one of the replicated servers, so that a router can establish a connection between the selected server and the service-requesting client computer.

Preferably the domain name server is arranged to select the least loaded replicated server or the nearest replicated server. Each replicated server can transmit a resource message which contains information about available resources at the server in question, and about the link parameters of the server."

4) col. 4 , line 36-40, "Each server produces a resource advertisement for each coverage area and indicates the largest amount of accessible resources for reservations on the interface of each of the servers in the coverage area, together with the delay parameters of the link."

Based upon the above teachings, Examiner **concludes** that Kavak does not teach "the server system is a one of a plurality of cache server systems."

Yates teaches at col. 3, line 52-65, "The invention also provides a manner in which caching servers may cooperate to service client requests. In particular, each server has the ability to cache and discard documents based on its local load, the load

on its neighboring caches, adjacent communication path load, and on document popularity. For example, each server maintains an estimate of the load at its neighbors, and communicates its own load estimate to neighboring cache servers. If a cache server notices that it is overloaded with respect to any of its neighbors, it offloads or transfers a fraction of its work to its under loaded neighbors. To do so, a cache server also preferably learns the identity of its neighboring upstream (or parent)and downstream (or child) nodes on the routing graph that is rooted at a given home server." ("the server system is a one of a plurality of cache server systems.").

However so, <u>Yates has been a critique of use the DNS servers in association with the cache servers</u>, as stated in col. 2, line 58-col. 3, line 5, "However, such caching techniques do not necessarily or even typically achieve optimum distribution of document request loading. In particular, in order for the caches to be most effective, the DNS name service or other message routing mechanism must be appropriately modified to intercept requests for documents for which the expected popularity is high. The introduction of cache copies thus increases the communication overhead of name resolution, because of the need to locate the transient copies. The name service must register these copies as they come into existence, disseminate this information to distribute demand for the documents, and ensure the timely removal of records for deleted cache copies. Often times, the cache lookup order is fixed, and/or changes in document distribution must be implemented by human intervention.", <u>without realizing it's own deficiencies such as</u>, as shown in Fig. 1, some of the "ROUTERS" such as 14-7 and 14-9 do not have the "Cache servers", and as stated in col. 7, line 27-35, "In a

most general description of the operation of the invention, document request messages travel up the tree T, from a client at which it originated, such as client 12-3, towards the home server 20. Certain routers encountered by the document request message along the way, such as router 14-7, do not have local cache servers 16, and thus simply pass the document request message up to Find the next router in the tree, such as router 14-6."

However, the one having ordinary skills in the art is looking at Kavak teachings at "Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc.", along with the replication servers, DNS servers having knowledge of all anycast-groups, scaling and performance reasons anycast-groups can be distributed over many domain name servers and the anycast-group members can be connected to the domain name servers by a point-to-multipoint-connection, it would have been obvious to combine the

teachings Kavak with Yates to come with the system as claimed with the advantages of applying the anycast-technology to cache servers.

Referring to claim 2,

Kavak teaches the method of claim 1, wherein the common address is an anycast address (Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc.")

Referring to claim 4,

Keeping in mind the teachings of Kavak, Kavak does not teach the method of claim 1, wherein the cache server systems are geographically distributed across the network.

Yates teaches the method of claim 1, wherein the cache server systems are geographically distributed across the network. (Fig. 10).

However, the one having ordinary skills in the art is looking at Kavak teachings at "Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-

technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc.", <u>along with the replication servers, DNS servers having knowledge of all anycast-groups, scaling and performance reasons anycast-groups can be distributed over many domain name servers and the anycast-group members can be connected to the domain name servers by a point-to-multipoint-connection,</u> it would have been obvious to combine the teachings Kavak with Yates to come with the system as claimed with the advantages of applying the anycast-technology to cache servers.

Referring to claim 14,

Kavak teaches a method of claim 1, further comprising after discontinuing advertisement by a DNS device for an associated server system having a load characteristic that exceeds the predefined overload metric (col. 3, line 39-50, "The type of application assists the domain name server in selecting the most relevant server for each request. In some cases the least loaded server is selected, whereas in other cases the cheapest link and belonging server is selected.

The domain name server receives continuously routing information from all anycast-servers which it is serving. The routing information is transmitted via the connections marked 7 in the FIG. 1. The routing information includes details about the available capacity for each link, the number of jumps to each server, the bandwidth of each link, the processor capacity, measured delay etc. The domain name server returns the IP-address to the server which is best adapted to the application demands which are derived from the DNS-request. When the IP-address has been resolved, it is returned to the client computer so that a direct connection is established between the client computer and the server."), restarting advertising when the load characteristic decreases below the predefined overload metric (col. 4, line 25-53, "An anycast-server, ANS, which can be located together with the domain name server 2, holds information about the membership for all anycast-service members 5A-5E. A node can register itself at the anycast-service, <u>join as a member, withdraw from and stop participating in the ANS-service.</u>

To make load sharing distribution to least loaded servers, each server needs to inform the surroundings about its accessible resources. To this purpose a Resource Advertisement (RA) is transmitted. At calculation of service quality routes (QoS routes), RA is used.

Each server produces a resource advertisement for each coverage area and indicates the largest amount of accessible resources for reservations on the interface of each of the servers in the coverage area, together with the delay parameters of the link. These parameters are roughly analogous to the standard cost value "Open Shortest

Path First" (OSPF), but are independent of the standard service type value to better characterize the static delay characteristics of a link. A new copy of the resource message is produced whenever a new routing resource advertisement is produced for the coverage area, or whenever the available bandwidth resource or the delay is changed for a link in the coverage area. An algorithm can be used so that a new resource advertisement is produced only when the available bandwidth resource is changed to a considerable extent. Resource advertisements are transmitted in flows through one single coverage area. The format of the resource advertisement is shown in FIG. 2.")

Based upon the above teachings, Examiner **concludes** that Kavak does not teach "the server system is a one of a plurality of cache server systems."

Yates teaches at col. 3, line 52-65, "The invention also provides a manner in which caching servers may cooperate to service client requests. In particular, each server has the ability to cache and discard documents based on its local load, the load on its neighboring caches, adjacent communication path load, and on document popularity. For example, each server maintains an estimate of the load at its neighbors, and communicates its own load estimate to neighboring cache servers. If a cache server notices that it is overloaded with respect to any of its neighbors, it offloads or transfers a fraction of its work to its under loaded neighbors. To do so, a cache server also preferably learns the identity of its neighboring upstream (or parent)and downstream (or child) nodes on the routing graph that is rooted at a given home server." ("the server system is a one of a plurality of cache server systems.").

However so, <u>Yates has been a critique of use the DNS servers in association with the cache servers</u>, as stated in col. 2, line 58-col. 3, line 5, "However, such caching techniques do not necessarily or even typically achieve optimum distribution of document request loading. In particular, in order for the caches to be most effective, the DNS name service or other message routing mechanism must be appropriately modified to intercept requests for documents for which the expected popularity is high. The introduction of cache copies thus increases the communication overhead of name resolution, because of the need to locate the transient copies. The name service must register these copies as they come into existence, disseminate this information to distribute demand for the documents, and ensure the timely removal of records for deleted cache copies. Often times, the cache lookup order is fixed, and/or changes in document distribution must be implemented by human intervention.", <u>without realizing it's own deficiencies such as</u>, as shown in Fig. 1, some of the "ROUTERS" such as 14-7 and 14-9 do not have the "Cache servers", and as stated in col. 7, line 27-35, "In a most general description of the operation of the invention, document request messages travel up the tree T, from a client at which it originated, such as client 12-3, towards the home server 20. Certain routers encountered by the document request message along the way, such as router 14-7, do not have local cache servers 16, and thus simply pass the document request message up to Find the next router in the tree, such as router 14-6."

However, the one having ordinary skills in the art is looking at Kavak teachings at "Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-

technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc.", <u>along with the replication servers, DNS servers having knowledge of all anycast-groups, scaling and performance reasons anycast-groups can be distributed over many domain name servers and the anycast-group members can be connected to the domain name servers by a point-to-multipoint-connection,</u> it would have been obvious to combine the teachings Kavak with Yates to come with the system as claimed with the advantages of applying the anycast-technology to cache servers.

Referring to claim 16,

Kavak teaches the method as recited in claim 3, further comprising storing, by each of the routers, multiple routes in association with the common address in a routing table (col. 5, line 5-26, "When a new replicated server connects to an anycast-group, the local router informs about the existence of the service as a part of its normal routing exchanges with the neighbouring routers. If the local router observes that a replicated server has stopped transmitting messages, also this negative information is transmitted

to the neighbouring routers. Each of the neighbouring routers studies a distance value for the announced anycast-server, updates its tables based on this value, and forwards in its turn the updated information to its neighbours. Each router maintains knowledge at least of the route to the nearest anycast-servers and possibly a small list over alternative servers in case it is informed that the previous nearest server is down. In this way every router in the network will have the sufficient knowledge to route anycast-packets to the nearest server, but need not maintain a database over all anycast-servers in the network. If a client transmits a request for connection to the anycast-group, and if it is not a service in the local subnetwork, the local router forwards the packet to the nearest replicated server based on the current routing tables.")

Referring to claim 17,

Kavak teaches the method as recited in claim 16, further comprising: receiving a DNS resolution request at one of the routers, wherein the request specifies the common address and requests resolution of a DNS name; selecting a route representing the shortest network distance to one of the DNS devices; and resolving the DNS name to a unique address of the server system associated with the one of the DNs devices. (col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.")

Based upon the above teachings, Examiner **concludes** that Kavak does not teach "the server system is a one of a plurality of cache server systems."

Yates teaches at col. 3, line 52-65, “The invention also provides a manner in which caching servers may cooperate to service client requests. In particular, each server has the ability to cache and discard documents based on its local load, the load on its neighboring caches, adjacent communication path load, and on document popularity. For example, each server maintains an estimate of the load at its neighbors, and communicates its own load estimate to neighboring cache servers. If a cache server notices that it is overloaded with respect to any of its neighbors, it offloads or transfers a fraction of its work to its under loaded neighbors. To do so, a cache server also preferably learns the identity of its neighboring upstream (or parent)and downstream (or child) nodes on the routing graph that is rooted at a given home server.” (“the server system is a one of a plurality of cache server systems.”).

However so, <u>Yates has been a critique of use the DNS servers in association with the cache servers</u>, as stated in col. 2, line 58-col. 3, line 5, “However, such caching techniques do not necessarily or even typically achieve optimum distribution of document request loading. In particular, in order for the caches to be most effective, the DNS name service or other message routing mechanism must be appropriately modified to intercept requests for documents for which the expected popularity is high. The introduction of cache copies thus increases the communication overhead of name resolution, because of the need to locate the transient copies. The name service must register these copies as they come into existence, disseminate this information to distribute demand for the documents, and ensure the timely removal of records for deleted cache copies. Often times, the cache lookup order is fixed, and/or changes in

document distribution must be implemented by human intervention.", without realizing it's own deficiencies such as, as shown in Fig. 1, some of the "ROUTERS" such as 14-7 and 14-9 do not have the "Cache servers", and as stated in col. 7, line 27-35, "In a most general description of the operation of the invention, document request messages travel up the tree T, from a client at which it originated, such as client 12-3, towards the home server 20. Certain routers encountered by the document request message along the way, such as router 14-7, do not have local cache servers 16, and thus simply pass the document request message up to Find the next router in the tree, such as router 14-6."

However, the one having ordinary skills in the art is looking at Kavak teachings at "Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc.", along with the replication servers, DNS servers having knowledge of all anycast-groups, scaling and performance reasons anycast-groups can be distributed over many domain

name servers and the anycast-group members can be connected to the domain name servers by a point-to-multipoint-connection, it would have been obvious to combine the teachings Kavak with Yates to come with the system as claimed with the advantages of applying the anycast-technology to cache servers.

Referring to claim 30,

Claim 30 is a claim to system for content delivery in a network carrying out the method of claim 1. Therefore claim 30 is rejected for the reasons set forth for claim 1.

Referring to claim 31,

Claim 31 is a claim to system for content delivery in a network carrying out the method of claim 14. Therefore claim 31 is rejected for the reasons set forth for claim 14.

Referring to claim 34,

Claim 34 is a claim to computerized device for content delivery in a network carrying out the method of claim 1. Therefore claim 34 is rejected for the reasons set forth for claim 1.

Referring to claim 35,

Claim 35 is a claim to computerized device for content delivery in a network carrying out the method of claim 14. Therefore claim 35 is rejected for the reasons set forth for claim 14.

Referring to claim 38,

Claim 38 is a claim to computer program product including a computer-readable medium having instructions stored thereon for performing content delivery operations in

a network in accordance with the method of claim 1. Therefore claim 38 is rejected for the reasons set forth for claim 1.

Referring to claim 39,

Claim 39 is a claim to computer program product including a computer-readable medium having instructions stored thereon for performing content delivery operations in a network in accordance with the method of claim 14. Therefore claim 39 is rejected for the reasons set forth for claim 14.

Referring to claim 41,

Kavak teaches a method of content delivery in a network (Abstract), comprising:

associating each of a plurality of devices in a Domain Name System (DNS) with one of a plurality of server systems located in the network and maintaining on each of the server systems content stored on an origin server (Fig. 1, elements 1-8, col. 3, line 10-29, “In FIG. 1 is shown a diagram over a preferred arrangement according to the invention. A client computer 1 has a virtual circuit connection established to its domain name servers (DNS) 2, of which one is shown in the figure, via the network 3. There may be a secondary connection to a reserve domain name server (not shown) which can be accessed at error or at break/interruption. In the network there are a number of routers 4, which establish connections with servers 5A to 5E as service suppliers. All the servers 5A, 5B, 5C, 5D, 5E are copies of each other and constitute the same anycast-group or "common address group". Anycast-groups only transmit a virtual IP-address to their neighbours. A logical address can correspond to a number of physical addresses.

The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.”);

assigning to the DNS devices a common address (col. 3, line 65-col. 4, line 10, “To select one server out of the different suitable, exactly alike servers, anycast-technology is used. **An anycast-address (common address) is used to represent a group of nodes, one of which shall be selected.** When an anycast-address is received, the domain name server delivers the IP-address to all destinations which are represented by the anycast-address. Since many servers can have the same anycast-address, the router conventionally selects one of them by collecting information about the number of jumps to the different servers and selects the nearest one. Use of links is another at present available criterion. Other possible criteria are costs, processor load, storage, routing policy etc.”, col. 3, line 10-29, “The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.”);

advertising, by each of the DNS devices, the common address within the network to indicate that the content is available for retrieval from each associated server system by end user systems communicatively connected to the network (col. 4, line 31-35, “To make load sharing distribution to least loaded servers, each server needs to inform the surroundings about its accessible resources. To this purpose a Resource

Advertisement (RA) is transmitted. At calculation of service quality routes (QoS routes), RA is used.", col. 4, line 54-57, "The number of links is the link number which is included in the resource advertisement. For each link, the link type, link identity, and link data, are the same as for the routing resource advertisement.", col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. For scaling and performance reasons anycast-groups can be distributed over many domain name servers. The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.");

monitoring one or more load characteristics of one or more of the server systems in the network (col. 2, line 1-6, "Preferably the domain name server is arranged to select the least loaded replicated server or the nearest replicated server. Each replicated server can transmit a resource message which contains information about available resources at the server in question, and about the link parameters of the server.");

determining if one or more of the load characteristics exceeds a predefined overload metric (col. 3, line 39-50, "The type of application assists the domain name server in selecting the most relevant server for each request. In some cases the least loaded server is selected, whereas in other cases the cheapest link and belonging server is selected.

The domain name server receives continuously routing information from all anycast-servers which it is serving. The routing information is transmitted via the connections marked 7 in the FIG. 1. The routing information includes details about the available capacity for each link, the number of jumps to each server, the bandwidth of

each link, the processor capacity, measured delay etc. The domain name server returns the IP-address to the server which is best adapted to the application demands which are derived from the DNS-request. When the IP-address has been resolved, it is returned to the client computer so that a direct connection is established between the client computer and the server."); and

discontinuing advertising of the common address by each DNS device associated with a server system determined to have a load characteristic that exceeds the predefined overload metric col. 4, line 31-35, "To make load sharing distribution to least loaded servers, each server needs to inform the surroundings about its accessible resources. To this purpose a Resource Advertisement (RA) is transmitted. At calculation of service quality routes (QoS routes), RA is used.", col. 4, line 54-57, "The number of links is the link number which is included in the resource advertisement. For each link, the link type, link identity, and link data, are the same as for the routing resource advertisement."

col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. <u>For scaling and performance reasons anycast-groups can be distributed over many domain name servers.</u> The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection.")

after discontinuing advertisement by a DNS device for an associated server system having a load characteristic that exceeds the predefined overload metric, performing the steps of: enabling the server system to be accessed by another system that has already resolved a DNS name to the DNS device until the DNS name expires;

and restarting advertising when the load characteristic decreases below the predefined overload metric (col. 4, line 25-53, “An anycast-server, ANS, which can be located together with the domain name server 2, holds information about the membership for all anycast-service members 5A-5E. A node can register itself at the anycast-service, join as a member, withdraw from and stop participating in the ANS-service.

To make load sharing distribution to least loaded servers, each server needs to inform the surroundings about its accessible resources. To this purpose a Resource Advertisement (RA) is transmitted. At calculation of service quality routes (QoS routes), RA is used.

Each server produces a resource advertisement for each coverage area and indicates the largest amount of accessible resources for reservations on the interface of each of the servers in the coverage area, together with the delay parameters of the link. These parameters are roughly analogous to the standard cost value "Open Shortest Path First" (OSPF), but are independent of the standard service type value to better characterize the static delay characteristics of a link. A new copy of the resource message is produced whenever a new routing resource advertisement is produced for the coverage area, or whenever the available bandwidth resource or the delay is changed for a link in the coverage area. An algorithm can be used so that a new resource advertisement is produced only when the available bandwidth resource is changed to a considerable extent. Resource advertisements are transmitted in flows through one single coverage area. The format of the resource advertisement is shown in FIG. 2.”)

Kavak's following teachings, as gleaned from the perspective of an ordinary skills in the art, are also of paramount importance:

1) col. 3, line 10-29, "The domain name server has knowledge of all anycast-groups. <u>For scaling and performance reasons anycast-groups can be distributed over many domain name servers.</u> The anycast-group members are connected to the domain name servers by a point-to-multipoint-connection."

2) Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc."

3) Consequently the present invention provides an arrangement for load sharing in a computer network, comprising a larger number of users or clients with computers, at least one service supplier which provides services via a number of replicated servers, a computer network with routers which can connect the client computers with the servers in order to connect a client computer which requests a service with suitable server.

According to the invention a number of replicated servers belong to a common address group (anycast-group) and each anycast-group is connected to a domain name server which has the ability to select one of the replicated servers, so that a router can establish a connection between the selected server and the service-requesting client computer.

Preferably the domain name server is arranged to select the least loaded replicated server or the nearest replicated server. Each replicated server can transmit a resource message which contains information about available resources at the server in question, and about the link parameters of the server."

4) col. 4 , line 36-40, "Each server produces a resource advertisement for each coverage area and indicates the largest amount of accessible resources for reservations on the interface of each of the servers in the coverage area, together with the delay parameters of the link."

Based upon the above teachings, Examiner **concludes** that Kavak does not teach "the server system is a one of a plurality of cache server systems."

Yates teaches at col. 3, line 52-65, "The invention also provides a manner in which caching servers may cooperate to service client requests. In particular, each server has the ability to cache and discard documents based on its local load, the load on its neighboring caches, adjacent communication path load, and on document popularity. For example, each server maintains an estimate of the load at its neighbors, and communicates its own load estimate to neighboring cache servers. If a cache server notices that it is overloaded with respect to any of its neighbors, it offloads or

transfers a fraction of its work to its under loaded neighbors. To do so, a cache server also preferably learns the identity of its neighboring upstream (or parent)and downstream (or child) nodes on the routing graph that is rooted at a given home server." ("the server system is a one of a plurality of cache server systems.").

However so, Yates has been a critique of use the DNS servers in association with the cache servers, as stated in col. 2, line 58-col. 3, line 5, "However, such caching techniques do not necessarily or even typically achieve optimum distribution of document request loading. In particular, in order for the caches to be most effective, the DNS name service or other message routing mechanism must be appropriately modified to intercept requests for documents for which the expected popularity is high. The introduction of cache copies thus increases the communication overhead of name resolution, because of the need to locate the transient copies. The name service must register these copies as they come into existence, disseminate this information to distribute demand for the documents, and ensure the timely removal of records for deleted cache copies. Often times, the cache lookup order is fixed, and/or changes in document distribution must be implemented by human intervention.", without realizing it's own deficiencies such as, as shown in Fig. 1, some of the "ROUTERS" such as 14-7 and 14-9 do not have the "Cache servers", and as stated in col. 7, line 27-35, "In a most general description of the operation of the invention, document request messages travel up the tree T, from a client at which it originated, such as client 12-3, towards the home server 20. Certain routers encountered by the document request message along the way, such as router 14-7, do not have local cache servers 16, and thus simply pass

the document request message up to Find the next router in the tree, such as router 14-6."

However, the one having ordinary skills in the art is looking at Kavak teachings at "Col. 4, line 10-24, "One important aspect of the invention is to use the anycast-technology to access services which are delivered by a larger number of servers which are operating on different network nodes. Especially the same service can be accessed by one single anycast-address irrespective of how many servers that are used for the service and of where the servers are located in the network. To copy the service at many servers over the network is useful when high service accessibility is required. Other services which might benefit from anycast-technology include: World Wide Web, video services, domain name servers, address resolving servers, Neighbour Discovery-servers, 020-number services, telephoning via Internet, and the Public Switched Telephone Network in order to find the most cost efficient voice services etc.", along with the replication servers, DNS servers having knowledge of all anycast-groups, scaling and performance reasons anycast-groups can be distributed over many domain name servers and the anycast-group members can be connected to the domain name servers by a point-to-multipoint-connection, it would have been obvious to combine the teachings Kavak with Yates to come with the system as claimed with the advantages of applying the anycast-technology to cache servers.

5. Claims 3, 5-7, 9, 15, 32, 33, 36 ,37 and 40 are rejected under 35 U.S.C. 103(a) as being Unpatentable over Kavak (US 6, 687, 731) in view of Yates et al. (hereinafter

Yates) (US 6, 167, 438) , as applied to above claims and further in view of Garcia-Luna-Aceves (hereinafter Garcia) (US 2006/0271705 A1).

Referring to claims 3, 5-7, 9 and 15,

Keeping in mind the teaching of Kavak and Yates, both of these references fail to teach teaches Garcia teaches the method of claim 1, wherein the advertising act comprises: sending routing information to a plurality of routers in the network in accordance with the Border Gateway Protocol (BGP).

Garcia teaches the method of claim 1, wherein the advertising act comprises: sending routing information to a plurality of routers in the network in accordance with the Border Gateway Protocol (BGP) (para. [0065], "A Web router may be co-located with a Web server, a Web cache, or an original content server. In one embodiment of the present invention, a Web router may be implemented in software to be executed by a general purpose (or special purpose) computer processor, or it may be implemented as part of the software of a router or Web cache. In another embodiment of the present invention, some or all of the Web router functionality may be implemented in hardware.", para.[0082], "In an embodiment of the present invention, Web routers use routing information provided by the Border Gateway Protocol (BGP) and any of the intra-domain routing protocols (e.g., OSPF, EIGRP) running in the routers attached to the same local area networks where the Web routers reside to derive distances to client address ranges.")

Garcia teaches the method of claim 1, wherein the DNS devices are collocated with the cache server systems with which the DNS devices are associated. (para.[0086], "The specific algorithm that a Web router executes to compute the distance to the nearest Web cache storing a copy of an information object depends on the routing information that the Web routers use to compute distances to other Web routers, which are collocated with the Web caches storing information objects.")

Garcia teaches the method of claim 1, wherein each cache server system and associated DNS devices are located in a different Internet Service Provider Point of Presence. (para.[0062], "For example, clients 105 may have accounts with local Internet service providers (ISPs) 110 that enable the clients to connect to the Internet using conventional dial-up or one of a variety of high-speed connections (e.g., DSL connections, cable connections, hybrids involving satellite and dial-up connections, etc.). ISPs 110, in turn, may provide direct connections to the Internet or, as shown, may rely on other service providers 120, 130, 140, to provide connections through to a set of high-speed connections between computer resources known as a backbone 150.", para. [0067] To reduce communication and processing overhead in Web routers, a

topology of Web routers is defined, such that a given Web router has as its neighbor Web routers a subset of all the Web routers in the system (where the term system refers to all or a portion of the virtual network for Web routers discussed above). A Web router may thus be configured with its set of neighbor Web routers. Such a configuration

may be a table of neighbor Web routers which is defined by a network service provider and/or is dynamically updated.")

Garcia teaches the method of claim 1, wherein each cache server system and associated DNS device is located at or near an entry point of the network. (para.[0062],"For example, clients 105 may have accounts with local Internet service providers (ISPs) i 10 that enable the clients to connect to the Internet using conventional dial-up or one of a variety of high-speed connections (e.g., DSL connections, cable connections, hybrids involving satellite and dial-up connections, etc.). ISPs 110, in turn, may provide direct connections to the Internet or, as shown, may rely on other service providers 120, 130, 140, to provide connections through to a set of high-speed connections between computer resources known as a backbone 150. ", para. [0067] To reduce communication and processing overhead in Web routers, a topology of Web routers is defined, such that a given Web router has as its neighbor Web routers a subset of all the Web routers in the system (where the term system refers to all or a portion of the virtual network for Web routers discussed above). A Web router may thus be configured with its set of neighbor Web routers. Such a configuration may be a table of neighbor Web routers which is defined by a network service provider and/or is dynamically updated.")

Garcia teaches the method of claim 1, wherein at least one of the cache server systems comprises at least two cache serves connected in a cluster, and wherein the at least two cache servers are coupled to a switch usable to select from among the at least two cache serves based on a selection policy. (para.[0073], "In a

further embodiment, one of the following four mechanisms, or, a combination of some of the following four mechanisms, is or may be used to communicate the best Web cache or content server, or the set of Web caches, which should serve a client's request: [0074] (1) direct cache selection; [0075] (2) redirect cache selection; [0076] (3)remote DNS cache selection; and [0077] (4) client DNS cache selection. These approaches are disclosed in co-pending and commonly-owned U.S. Provisional Application No. 60/200,404, entitled "System and Method for Using a Mapping Between Client Addresses and Addresses of Caches to Support Content Delivery", filed Apr. 28, 2000 by J. J. Garcia-Luna-Aceves and Bradley R. Smith, the complete disclosure of which is hereby incorporated by reference.")

Garcia teaches the method of claim 1, further comprising, if a DNS device discontinues advertisement of it associated cache server system, continuing to use the cache server system by another system that has already resolved a DNS name to the DNS device, until the DNS name expires(para,[0086], "The specific algorithm that a Web router executes to compute the distance to the nearest Web cache storing a copy of an information object depends on the routing information that the Web routers use to compute distances to other Web routers, which are collocated with the Web caches storing information objects. A Web router is informed by its local Web caches of the load in the Web caches and the information objects stored in the Web caches. Hence, a Web router knows that its distance to information objects stored in local Web caches is the latency incurred in obtaining those objects from the local Web caches, which is a direct function of the load in those Web caches. Given that a Web router executes a routing

algorithm enabling the Web router to know its distance to other Web routers, a Web router selects the nearest Web cache storing a copy of an information object by comparing the local distance to the information object (which is the latency incurred by a local Web cache if the object is stored locally or infinity if the object is not stored locally) with the reported matches of object identifiers to Web caches reported by its neighbor Web routers. The object-cache match report for a given information object specifies the information object identifier, the Web cache where the information object is stored, the Web router that is local to that Web cache, and the distance to the Web cache. The distance specified in the object-cache match report includes explicitly or implicitly the distance from the neighbor Web router to the Web cache specified in the report, plus the load of the Web cache specified in the report. The Web router then chooses the match of information object to Web cache that produces the minimum distance to the Web cache storing the object.")

Therefore it would have been obvious to use the teachings of Garcia such as, the BGP, collocating DNS devices with the cache server systems, locating the cache server system and associated DNS device at or near an entry point of the network, DNS devices are located in a different Internet Service Provider Point of Presence in the combined system of Kavak and Yates as presented in claim 1, since all these techniques are known to provide efficient distribution of information and protocols to the consumers.

Referring to claim 32,

Claim 32 is a claim to computerized device for content delivery in a network carrying out the method of claim 15. Therefore claim 32 is rejected for the reasons set forth for claim15.

Referring to claim 33,

Claim 33 is a claim to system for content delivery in a network carrying out the method of claim 3. Therefore claim 33 is rejected for the reasons set forth for claim 3.

Referring to claim 36,

Claim 36 is a claim to computerized device for content delivery in a network carrying out the method of claim 15. Therefore claim 36 is rejected for the reasons set forth for claim15.

Referring to claim 37,

Claim 37 is a claim to computerized device for content delivery in a network carrying out the method of claim 3. Therefore claim 37 is rejected for the reasons set forth for claim 3.

Referring to claim 40,

Claim 40 is a claim to computer program product including a computer-readable medium having instructions stored thereon for performing content delivery operations in a network in accordance with the method of claim 15. Therefore claim 40 is rejected for the reasons set forth for claim 15.

Conclusion

Examiner's note: Examiner has cited particular columns and line numbers in the

references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ashok B. Patel whose telephone number is (571) 272-3972. The examiner can normally be reached on 6:30 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan A. Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/ASHOK PATEL/

Primary Examiner, Art Unit 2154